OILFIELD BOILER OPERATOR SYLLABUS

GENERAL INFORMATION

This Syllabus is intended to assist candidates in their preparation for writing the examination. It contains the recommended body of knowledge required. It is strongly advised that, before undertaking this Examination, the candidate completes an appropriate study course and is familiar with operation of boilers in general. These courses may be offered by various educational institutions in Saskatchewan.

EXAMINATION INFORMATION

Exam Type:	*multiple choice questions*
Writing Time:	*1.5 hrs*
Exam Materials:	*The Boiler and Pressure Vessel Act, 1999 The Boiler and Pressure Vessel Regulations (effective Jan 1, 2018) CSA B51-03 Boiler, Pressure Vessel and Pressure Piping Code Non programmable calculator*
Passing Grade:	*65%*

Note:

- The candidate must provide picture ID to the Examiner prior to the examination.
- No cell phone or any electronic communication devices are allowed to be brought into the examination room.
- The items referenced above must be shown to the examiner for approval. • No other reference material is allowed.
- Important: If your calculator is programmable, you must reset it in the company of the examiner so that the examiner is sure that all memories are clear. Or the examiner may request that you remove the battery to erase all memory. This may be done during your examination time, so be aware that you may have less time to complete your exam. If the memories do not clear by resetting the calculator or by removing the battery, the calculator shall not be used. Also, if your calculator fails to function after reset or battery removal, the examiner is not responsible and you may be at a significant disadvantage.

Please be aware that candidates failing to obtain a passing grade will be required to wait 30 days before they will be eligible to reapply for examination.

SYLLABUS INFORMATION

The Boiler and Pressure Vessel Act & Regulations and Reference Codes

1. A general knowledge of *The Boiler and Pressure Vessel Act and Regulations.*
2. Operator staffing requirements for both high and low pressure boilers.
3. Duties of an operator or owner as specified by *The Boiler and Pressure Vessel Act*
4. An awareness of the purpose and importance of the CSA and ASME Codes.

Basic Principles of Thermodynamics

1. Knowledge of and conversion ability for the Fahrenheit and Celsius temperature scales.
2. Heat characteristics and methods of heat transmission (radiation; conduction; convection; sensible and latent heat; vaporization).
3. Properties of steam and water (relationship of pressure to boiling point; expansion properties of steam).
4. Temperature measurement (thermometer types).

Common Well-Site Boiler Design

1. Boiler terminology (defining common boiler terms).
2. Boiler classifications (firetube, watertube, locomotive, scotch; and packaged boilers; comparison between types).
3. Gas flow patterns and water circulation.
4. Common oilfield boiler makes and specific characteristics Lister; Napanee, Volcano, Saskatoon).

Boiler Water Treatment

1. Causes of corrosion scale, foaming, and priming.
2. Methods of external water treatment (filters; softeners).
3. Methods of internal water treatment (scale prevention; sludge conditioning; prevention of foaming; pH control; caustic embrittlement prevention; corrosion prevention).
4. Chemical feeder types.
5. Function of blow-off in water treatment programs.
6. Sampling methods.
7. Various testing procedures and terminology (pH; hardness; total alkalinity; sodium sulphite; phosphate; dissolved solids test).
8. Implementing a water treatment program.

Pumps and Injectors

1. Terms and theory of pumping.
2. Types of pumps, their characteristics, and applications (reciprocating; rotary; centrifugal; turbine).
3. Pump parts (casing; impellers; wearing rings; gears; pistons; cylinders; suction and discharge valves).
4. Pump operation and maintenance (priming, cavitation, flexible couplings, mechanical seals, packing procedures, general operation and maintenance; trouble shooting).

Automatic Boiler Controls

1. Impurities and sources, chemical symbols, suspended matter, reasons for water treatment.
2. Low water fuel cut-offs (purpose; principle of operation; types; mercury switches; feed water pump control; Code requirements; testing and maintenance).
3. Pressure controls (operating principle; on modulating; testing; parts and adjustment; high limit control requirement.)
4. Flame protection devices (operating principles and testing of the various scanner types).
5. Other control devices (high fire; low fire; low air pressure; damper positioning; automatic/manual selector switch).
6. Programming controls (purpose; operation sequence; trouble shooting).

Boiler Operation and Maintenance

1. Start up and shutdown procedures (abnormal conditions; uneven expansion; thermal shock; cutting in additional boiler).
2. Operating and maintenance procedures (operating logs; low and high water levels; flame failure; routine operating checks).
3. Boiler cleaning, inspections, repair and prolonged lay-up (fireside and waterside cleaning; external and internal inspection procedures; hydrostatic test; mechanical and chemical cleaning; dry and wet lay-up; tube plugging and replacement procedures; detection of cracks).
4. Emergency condition (low and high water level; flame or fan failure; boiler explosions)
5. Piping, fittings, and valves (identification; maintenance; required tools)

Site Safety

1. Electrical safety and rescue.
2. Elementary knowledge of First Aid and CPR.
3. Safe operating and maintenance procedures (safe entry practices; proper boiler operation).
4. Safety orientation and equipment (causes of accidents; safety meetings; eye, ear, head, hand, foot, and breathing protection devices).
5. Fire prevention and protection (classification of fires; extinguisher types; application and operation).

End